

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) A method of forming a seal in an electrochemical cell assembly comprising a plurality of separate elements including a plurality of plates, the method comprising:

(a) assembling the separate elements of the electrochemical fuel-cell together;

(b) providing at least one plate with a connection aperture and providing at least one groove network extending between ~~through~~ the separate elements and through each connection aperture and providing a filling port open to the exterior and in communication with the at least one groove network;

(c) connecting a source of liquid seal material to the filling port and injecting the seal material into the at least one groove network to fill the at least one groove network and simultaneously venting gas from the at least one groove network; and

(d) causing the seal material to set, to form a seal in the at least one groove network.

Claim 2. (previously presented) A method as claimed in claim 1, which includes filling the at least one groove network for a predetermined time at a predetermined pressure, to ensure filling of the at least one groove network.

Claim 3. (previously presented) A method as claimed in claim 2, which includes providing said separate elements with groove segments, for forming the at least one

groove network, and cleaning the groove segments prior to assembling the separate elements, to promote bonding of the seal material to the separate elements.

Claim 4. (original) A method as claimed in claim 3, which includes providing surfaces of the separate elements with a primer, to promote bonding of the seal material thereto.

Claim 5. (original) A method as claimed in claim 4, which includes priming the separate elements by one of:

applying a primer in liquid form to the separate elements;

plating a primer onto the separate elements; and

incorporating a primer material within the material of selected separate elements so as to improve the bonding capability of the surface of each such separate element to the seal material.

Claim 6. (original) A method as claimed in claim 2, which includes providing a liquid silicone elastomeric material as the seal material and curing the seal material at an elevated temperature for a predetermined time.

Claim 7. (currently amended) A method as claimed in claim 6, which includes curing the seal material by passing heated water through the electrochemical fuel-cell assembly.

Claim 8. (original) A method is claimed in claim 6, which includes preheating the assembled stack, prior to filling with groove network with seal material.

Claim 9. (currently amended) A method of forming a seal in an electrochemical cell assembly comprising a plurality of separate elements, the method comprising:

(a) providing the separate elements with groove segments to form at least one groove network and providing at least one connection aperture in one of the

plurality of separate elements, with the groove network extending between the plurality of separate elements and through each connection aperture;

- (b) assembling the separate elements together in abutting relationship;
- (c) providing a filling port open to the exterior and in communication with the at least one groove network;
- (d) connecting a source of liquid seal material to the filling port and injecting the seal material into the at least one groove network to fill the at least one groove network, the seal material being injected for a predetermined time and at a predetermined pressure, to ensure filling of the at least one groove network, while simultaneously venting gas from the at least one groove network; and
- (e) causing the seal material to set to form a seal in the at least one groove network.

Claim 10. (currently amended) A method as claimed in 9, which includes mounting the assembled elements in a mold and injecting the seal material around the exterior of the electrochemical fuel-cell assembly and simultaneously permitting seal material to flow into the groove network from the exterior, thereby to form said seal and to insulate said stack assembly.

Claim 11. (currently amended) A method as claimed in claim 9, which includes providing a membrane electrode assembly including a proton exchange membrane and gas diffusion media on both sides of the proton exchange membrane, and providing the proton exchange membrane with an external mounting flange, and causing the seal material to bond to the mounting flange, to seal the membrane electrode exchange-assembly in position.

Claim 12. (original) A method as claimed in claim 9, which includes providing a membrane electrode assembly including a proton exchange membrane and gas diffusion media on both sides of the proton exchange membrane, and having the seal material to bond to the proton exchange membrane.

Claim 13. (currently amended) A method as claimed in claim 11, which includes providing a plurality of electrochemical fuel-cells within the electrochemical fuel-cell stack~~assembly~~, providing each electrochemical fuel-cell with a pair of flow field plates, and a corresponding membrane electrode assembly, providing the mounting flange and the gas diffusion media extending to peripheries of the flow field plates, providing connection apertures for the at least one groove network extending through at least one flow field plate and providing a seal for each electrochemical fuel-cell around the edges of the flange and the gas diffusion media and bonded to the flow field plates.

Claim 14. (currently amended) A method as claimed in claim 12, which includes providing a plurality of electrochemical fuel-cells within the electrochemical cell fuel-stack~~assembly~~, providing each electrochemical fuel-cell with a pair of flow field plates, and a corresponding membrane exchange assembly, providing the proton exchange membrane and the gas diffusion media extending to peripheries of the flow field plates, providing connection apertures for the at least one groove network extending through at least one flow field plate and providing a seal for each electrochemical fuel-cell around the edges of the proton exchange membrane and the gas diffusion media and bonded to the flow field plates.

Claim 15. (currently amended) A method as claimed in 9, which includes, for each electrochemical fuel-cell in the electrochemical fuel-cell assembly, providing an anode flow field plate and a cathode flow field plate having facing, front surfaces, providing groove segments in said facing, front faces of the anode and cathode flow field plates defining a groove extending around the periphery of the membrane exchange assembly, and providing a the-membrane exchange assembly with a periphery which terminates in said groove without extending all the way across the groove.

16. (previously presented) A method as claimed in 9, which includes aligning the separate elements and clamping the said separate elements to apply a clamping pressure, prior to injecting the seal material.

17. (currently amended) A method as claimed in claim 153, which includes providing, as the membrane exchange assembly, a proton exchange membrane between the anode and cathode flow field plates and, ~~providing a~~ gas diffusion layer on both either ~~sides~~ of the proton exchange membrane, providing each of the anode and cathode flow field plates with a recess to accommodate one of the gas diffusion layers, and clamping the anode and cathode flow field plates, such that pressure on the gas diffusion layers is determined by depths of said recesses and is unaffected by injection of the seal material.

18. (original) A method as claimed in claim 16, which includes, after curing the seal material, one of removing the clamping of the elements whereby the seal material maintains the separate elements bonded to one another, and adjusting the clamping pressure to a final clamping pressure.

19. (currently amended) A method as claimed in claim 16, which includes, after clamping the separate elements together, mounting the separate elements in a mold and providing connection apertures between the groove network within the electrochemical fuel-cell assembly and the exterior thereof, and injecting the seal material into the mold around the exterior of the electrochemical fuel-cell assembly, whereby the seal material covers the exterior of the electrochemical fuel-cell assembly and flows through said connection apertures into the internal groove network.

20. (currently amended) A method as claimed in claim 19, which includes providing the mold with a profile to define individual external seals at joints between adjacent elements of the electrochemical fuel-cell assembly.

21. (original) A method as claimed in claim 1, which includes forming at least one vent for venting air from the groove network by scratching a surface of at least one of said separate elements.

22. (currently amended) A method as claimed in claim 2, which includes providing, for each electrochemical fuel-cell, a proton exchange membrane, and opposed cathode and anode flow field plates on either side of the proton exchange membrane, and offset grooves in the opposed flow field plates to prevent distortion of the proton exchange membrane during delivery of the liquid seal material.

23. (original) A method as claimed in claim 1, which includes delivering the liquid seal material at a pressure in the range 1-2000 psig, more preferably in the range of 80-300 psig.

24. (currently amended) A method as claimed in claim 1, which includes providing at least two separate groove networks, injecting a separate liquid seal material into each groove network of the electrochemical fuel-cell assembly and selecting the composition of each liquid seal material, to provide compatibility with materials and liquids required for electrochemical fuel-cell operation and durability.

25. (cancelled)

26. (previously presented) A method as claimed in claim 1, in which the liquid seal material comprises at least one of: an ethylene/acrylic polymer; a fluoro elastomer; and an Ethylene Propylene Terpolymer.

27. (previously presented) A method as claimed in claim 1, in which the liquid seal material comprises one of a flexible and a rigid epoxy resin, and wherein step (d) comprises curing the resin.

28. (previously presented) A method as claimed in claim 1, in which the liquid seal material comprises a thermoplastic elastomer, and wherein step (c) comprises supplying the thermoplastic elastomer in a liquid state, and step (d) comprises causing the thermoplastic elastomer to set.

29. (original) A method as claimed in claim 28, in which the thermoplastic elastomer comprises a polyester elastomer.

30. (currently amended) A method of forming a seal in an electrochemical cell assembly comprising a plurality of separate elements, the method comprising:

(a) assembling the separate elements of the electrochemical cell assembly together;

(b) providing at least one groove network extending through the separate elements, providing at least one connection aperture for the groove network in at least one element, and providing a filling port open to the exterior in communication with the at least one groove network, whereby the at least one groove network extends between the elements and through each connection aperture;

(c) connecting a source of liquid seal material to the filling port and injecting the seal material into the at least one groove network to fill the at least one groove network and simultaneously venting gas from the at least one groove network; and

(d) causing the seal material to set, to form a seal in the at least one groove network, to define at least one chamber for a fluid for operation of the electrochemical cell assembly.

31. (previously presented) A method as claimed in claim 30, in which the liquid seal material comprises one of a flexible and a rigid epoxy resin, and wherein step (d) comprises curing the resin.

32. (previously presented) A method as claimed in claim 31, in which the liquid seal material comprises a thermoplastic elastomer, and wherein step (c) comprises supplying the thermoplastic elastomer in a liquid state, and step (d) comprises causing the thermoplastic elastomer to set.